4.1.7. ATMOSPHERIC TRANSPORT

The CMDL isentropic trajectory model is used to understand better the role of transport in the distribution of trace species measured at the baseline observatories, as well as those measured on ships, on aircraft, and at other experimental sites. The standard gridded meteorological data used as input to the CMDL trajectory model come from the European Centre for Medium-Range Weather Forecasts (ECMWF) through the National Center for Atmospheric Research (NCAR). These data usually become available about 1 month after collection. Sixteen years of meteorological data (1986-2001) are now available on a CMDL server. The trajectory program is automated so that obtaining large volumes of trajectories (e.g., for a site climatology) is straightforward.

The trajectory input data are fairly coarse because of storage and processing constraints. The data have a horizontal resolution of 2.5º latitude × 2.5º longitude, a vertical resolution of 14 levels (from surface to 10 hPa), and a temporal resolution of 12 hours. Trajectories produced with these data are not suitable for diagnosis of mesoscale transport, but rather they track large-scale regional airflow. The gridded winds are interpolated kinematically to isentropic surfaces with the specification of arrival height, arrival pressure, or potential temperature. A description of the isentropic model is on the web (http://www.cmdl.noaa.gov/ozwv/traj/trajinfo.html). The method of wind interpolation to the isentropic surface is detailed in section 3.13.4 of *Summary Report No. 11* [*Harris and Bodhaine*, 1983].

Trajectories for various sites of interest are provided in real time on CMDL's trajectory website (http://www.cmdl.noaa.gov/ozwv/traj). CMDL scientists and collaborators are encouraged to contact the project leader to request a new site be added to this group. These trajectories are made with meteorological data downloaded twice daily from the National Centers for Environmental Prediction (NCEP). The differences between the ECMWF and NCEP data sets are usually slight, but to avoid confusion, it is recommended that the real-time trajectories be used only as a first look. Trajectories for publication should be based on the ECMWF data.

A new feature on the website is the capability to plot trajectories from the observatory archives (http://www.cmdl.noaa.gov/ozwv/traj/siteplot.html). The archives contain ECMWF trajectories arriving at the observatories for 1986 through the last date of available data (1 or 2 months prior to the present). Several arrival altitudes are provided. The user may obtain Postscript files and print the trajectories. Another new website (http://www.cmdl.noaa.gov/ozwv/traj/tchentry.html) allows a scientist to format the input parameters for a set of trajectory calculations and mail this information to the project leader.

Trajectories have been used to investigate the relationships of trace gas and aerosol measurements to their sources and sinks. Some studies utilizing trajectories at the CMDL observatories are cited in section 4.1.7 of *CMDL Summary Report No. 24* [*Hofmann et al.*, 1998]. More recently, *Harris et al.* [2000] analyzed trace gas correlations during winter dark periods at BRW with the use of trajectories. These papers are also listed on the web (http://www.cmdl.noaa.gov/ozwv/traj/papers.html).